

29-OCT-09
10:47:09

GEORGIA DEPARTMENT OF TRANSPORTATION
PRECONSTRUCTION DIVISION - OFFICE OF BRIDGE & STRUCTURAL DESIGN
THE ANALYSIS AND DESIGN OF PIERS FOR BRIDGES - V 4.2.07 - AASHTO SPECS 1984 INTERIM
REVISED: JUNE 30, 2008
36' CURB-CURB; 5 BEAMS; 140' SPAN; 50' TALL; BRIDGE 26 ; PIER 7,8

PROB. NO. 0001

DESIGN NO.	NO. CAN	NO. COL	NO. LLC	SKEW D	ANG M	F'C PSI	FC PSI	N	FY PSI	FS PSI	DESIGN DATA		CONC.	Z	* * * CAP			REINFORCING STEEL		* * * CAP					
OPTIONS											EC	ES	STRAIN	FACT	MAIN SIZE	STR SIZE	MAX TOP	MAX BOT	MIN SIZE	MIN NO.	MIN TOP	MIN CL.	MIN S.SP	MIN INCR.	MIN BOT
D D D L	2	1	12	0-00-00		3500.	1400.	8.	60000.	24000.	3409.	29000.	0.0030	170.	11	5	16	16	11	2	2.00	4.00	3.00	2.00	

COLUMN	REINFORCING	STEEL	R	KL	OC	OF	CM	BD1	BD2	IMPACT	SOIL	WT	ALL.S.P.	MIN	MAX	EDGE	PILE	REBAR	ALL.PILE	ALL.PILE	I
MIN.P	MAX.P	CL.SP.	CLEAR	MODE	COEF					%	KCF	KSF	PL SP	PL SP	PL SP	DIST	DEPTH	CLEAR	CAPACITY	UPLIFT	P
1.00	8.00	2.50	3.750	2	2.00	0.70	0.90	1.00	1.00	0.75	18.87	0.120	0.000	3.00	9.00	1.250	1.000	3.000	235.000	-9.999	

CAP DATA

CN	C	L	A	DE	BC	BE	DH	LH	XB1	XB2	XB3	XB4	XB5	XB6	XB7	XB8
11	L	19.625	4.000	4.000	6.000	6.000	4.000	15.625	16.000	8.000	4.000					
12	2	SAME AS CANTILEVER 1														

COLUMN DATA

CN	P	I	T	S	HT	A	DT	BT	DB	BB	DL	FLEX	ND	NB	SZ	ND	NB	SZ	ND	NB	SZ	SLOPE	EP	AP			
21	1	C	T		50.000	0.000	8.000	6.000	8.000	6.000	6.000	0.000	8	6	11	8	6	11	22	16	11	22	16	11	0.000	0.000	0.000

FOOTING DATA

CN	S/P	B	D	T	DEL.B	DEL.D	DEL.T	R.B/D	R.D/B	S.HT.	NP	SYM.	BP	DP	SET.
31	P	10.000	10.000	3.000	0.500	0.500	0.250	1.000	1.000	2.500	4	3	0.000	0.000	0.000

GROUP II WIND INTENSITIES

WIND	TRANS.	LONG.	WIND	FT1	FT1	WIND	FT2	FT2	FT3	FT3	FT4	FT4	FT5	FT5	* WIND	FORCE	ARM	* WIND	ON	PIER
															APT	APL	PT	PL		
1365.	2730.	1	50	0	44	6	41	12	33	16	17	19	7.375	7.375	6.475	15.966				

GROUP III WIND INTENSITIES

STD.	* WIND	ON	SUPERSTRUCTURE	INTENSITIES	* STD.	* WIND	ON	LIVE	LOAD	INTENSITIES	* LENGTHS	OF	LL	* WIND	ON	LL	ARMS								
WIND	FT1	FL1	FT2	FL2	FT3	FL3	FT4	FL4	FT5	FL5	TRANS.	LONGI.	APT	APL			APL								
1	50	0	44	6	41	12	33	16	17	19	1	100	0	88	12	82	24	66	32	34	38	140.0	280.0	15.583	15.583

MISCELLANEOUS FORCES

CENTRI.	TRACTION	FORCE	AND	ARMS	EXPANSION	SHRINKAGE	STREAM	FLOW
FT	FL	APT	APL	COEFFICIENT	COEFFICIENT	PT	PL	
3.908	9.860	15.583	15.583	0.00018000	0.00044000	0.000	0.000	

DEAD LOAD SUPERSTRUCTURE AND LIVE LOAD CASES

I.D.	NL	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	P11	P12
D.L.	0	281.621	325.334	0.000	325.334	0.000	325.334	281.621					
LL 1	1	85.882	51.529	0.000	0.000	0.000	0.000	0.000					
LL 2	2	85.882	103.059	0.000	85.882	0.000	0.000	0.000					
LL 3	3	85.882	103.059	0.000	120.235	0.000	85.882	17.176					
LL 4	1	0.000	0.000	0.000	0.000	0.000	51.529	85.882					
LL 5	2	0.000	0.000	0.000	85.882	0.000	103.059	85.882					
LL 6	3	17.176	85.882	0.000	120.235	0.000	103.059	85.882					
LL 7	1	0.000	25.764	0.000	85.882	0.000	25.764	0.000					
LL 8	2	42.941	111.647	0.000	94.470	0.000	25.764	0.000					
LL 9	3	42.941	111.647	0.000	103.059	0.000	111.647	42.941					
LL10	2	0.000	85.882	0.000	103.059	0.000	85.882	0.000					
LL11	2	85.882	51.529	0.000	0.000	0.000	51.529	85.882					
LL12	3	85.882	103.059	0.000	85.882	0.000	51.529	85.882					

COLUMN MOMENTS(KIP- FEET), SHEARS(KIPS), REACTIONS(KIPS)

TRANSVERSE

*

LONGITUDINAL

LOAD	COL	PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF
UNIT F.AT CL.CAP	1	0.000	-6.000	1.000	50.000	0.000	0.000	0.000	6.000	1.000	50.000	50.000
DEAD LOAD TOTAL	1	1765.594	2082.394	0.000	0.000	0.000	2082.394	8089.646	-8089.646	0.000	0.000	0.000
TRAC. FORCE 1 LN	1	0.000	0.000	0.000	0.000	0.000	0.000	0.000	-212.808	-9.860	-646.648	-646.648
CENT. FORCE 1 LN	1	0.000	-84.346	3.908	256.298	0.000	0.000	0.000	0.000	0.000	0.000	0.000
WIND ON SUBSTR.	1	0.000	-38.850	6.475	323.750	0.000	0.000	0.000	-95.796	-15.966	-798.300	-798.300
GROUP 2 WIND 1 1	1	0.000	-951.694	74.725	4239.594	0.000	0.000	0.000	-95.796	-15.966	-798.300	-798.300
GROUP 2 WIND 1 2	1	0.000	-951.694	74.725	4239.594	0.000	0.000	0.000	95.796	15.966	798.300	798.300
GROUP 2 WIND 2 1	1	0.000	-842.152	66.535	3769.693	0.000	0.000	0.000	-314.879	-32.346	-1738.103	-1738.103

PIER-36-5-140-50.OUT																
GROUP	WIND	2	2	1	0.000	-842.152	66.535	3769.693	0.000	0.000	0.000	314.879	32.346	1738.103	1738.103	
GROUP 2	WIND	3	1	1	0.000	-787.382	62.440	3534.742	0.000	0.000	0.000	-533.961	-48.726	-2677.905	-2677.905	
GROUP 2	WIND	3	2	1	0.000	-787.382	62.440	3534.742	0.000	0.000	0.000	533.961	48.726	2677.905	2677.905	
GROUP 2	WIND	4	1	1	0.000	-641.327	51.520	2908.207	0.000	0.000	0.000	-680.016	-59.646	-3304.440	-3304.440	
GROUP 2	WIND	4	2	1	0.000	-641.327	51.520	2908.207	0.000	0.000	0.000	680.016	59.646	3304.440	3304.440	
GROUP 2	WIND	5	1	1	0.000	-349.217	29.680	1655.137	0.000	0.000	0.000	-789.557	-67.836	-3774.341	-3774.341	
GROUP 2	WIND	5	2	1	0.000	-349.217	29.680	1655.137	0.000	0.000	0.000	789.557	67.836	3774.341	3774.341	
GROUP 3	WIND	1	1	1	0.000	-587.670	36.417	2190.040	0.000	0.000	0.000	-28.739	-4.790	-239.490	-239.490	
GROUP 3	WIND	1	2	1	0.000	-587.670	36.417	2190.040	0.000	0.000	0.000	28.739	4.790	239.490	239.490	
GROUP 3	WIND	2	1	1	0.000	-518.548	32.280	1938.890	0.000	0.000	0.000	-166.982	-13.064	-741.790	-741.790	
GROUP 3	WIND	2	2	1	0.000	-518.548	32.280	1938.890	0.000	0.000	0.000	166.982	13.064	741.790	741.790	
GROUP 3	WIND	3	1	1	0.000	-483.987	30.212	1813.315	0.000	0.000	0.000	-305.226	-21.338	-1244.089	-1244.089	
GROUP 3	WIND	3	2	1	0.000	-483.987	30.212	1813.315	0.000	0.000	0.000	305.226	21.338	1244.089	1244.089	
GROUP 3	WIND	4	1	1	0.000	-391.825	24.696	1478.449	0.000	0.000	0.000	-397.388	-26.854	-1578.956	-1578.956	
GROUP 3	WIND	4	2	1	0.000	-391.825	24.696	1478.449	0.000	0.000	0.000	397.388	26.854	1578.956	1578.956	
GROUP 3	WIND	5	1	1	0.000	-207.500	13.664	808.716	0.000	0.000	0.000	-466.510	-30.991	-1830.105	-1830.105	
GROUP 3	WIND	5	2	1	0.000	-207.500	13.664	808.716	0.000	0.000	0.000	466.510	30.991	1830.105	1830.105	
LIVE LOAD	LL	1	1	1	137.411	-1786.344	0.000	1786.344	137.411	1786.344	0.000	0.000	0.000	0.000	0.000	0.000

□ COLUMN MOMENTS(KIP- FEET), SHEARS(KIPS), REACTIONS(KIPS)

LOAD	COL	TRANSVERSE							LONGITUDINAL						
		PC	MT	V	MB	RF	ML	MR	MT	V	MB	MF			
LIVE LOAD	LL 2	1	274.823	-2198.584	0.000	2198.584	274.823	2198.584	0.000	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 3	1	371.011	-1113.041	0.000	1113.041	371.011	1978.726	-865.685	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 4	1	137.411	1786.344	0.000	-1786.344	137.411	0.000	-1786.344	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 5	1	274.823	2198.584	0.000	-2198.584	274.823	0.000	-2198.584	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 6	1	371.011	1113.041	0.000	-1113.041	371.011	865.685	-1978.726	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 7	1	137.410	0.000	0.000	0.000	137.410	206.112	-206.112	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 8	1	274.822	-1374.120	0.000	1374.120	274.822	1580.232	-206.112	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL 9	1	371.011	0.000	0.000	0.000	371.011	1422.209	-1422.209	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL10	1	274.823	0.000	0.000	0.000	274.823	687.056	-687.056	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL11	1	274.822	0.000	0.000	0.000	274.822	1786.344	-1786.344	0.000	0.000	0.000	0.000	0.000	0.000
LIVE LOAD	LL12	1	371.011	-371.016	0.000	371.016	371.011	1978.726	-1607.710	0.000	0.000	0.000	0.000	0.000	0.000

□ CAP ANALYSIS AND DESIGN DATA

POINT	MOMENTS(KIP- FEET)								SHEARS(KIPS)					
	D.L.TOT.	G1 MAX.+	G1 MAX.-	G2 MAX.+	G2 MAX.-	G3 MAX.+	G3 MAX.-	DL T.LT	DL T.RT	G1 + LT	G1 + RT	G1 - LT	G1 - RT	
P 1	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	-18.933	-385.040	-18.933	-385.040	-18.933	-571.490	
P 2	-3323.512	-3323.512	-4815.111	-3323.512	-3323.512	-3323.512	-4216.685	-440.751	-863.685	-440.751	-863.685	-627.201	-1273.876	
P 3	-6846.743	-6846.743	-9979.105	-6846.743	-6846.743	-6846.743	-8722.409	-898.729	-898.729	-898.729	-898.729	-1308.920	-1308.920	
C 1L	-10516.539	-10516.539	-15289.665	-10516.539	-10516.539	-10516.539	-13374.699	-936.169		-936.169		-1346.360		
C 1R	-10516.539	-10516.539	-15289.665	-10516.539	-10516.539	-10516.539	-13374.699		936.169		1346.360		936.169	
P 5	-6846.743	-6846.743	-9979.104	-6846.743	-6846.743	-6846.743	-8722.409	898.729	898.729	1308.920	1308.920	898.729	898.729	
P 6	-3323.512	-3323.512	-4815.110	-3323.512	-3323.512	-3323.512	-4216.685	863.685	440.751	1273.876	627.201	863.685	440.751	
P 7	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	-33.127	385.040	18.933	571.490	18.933	385.040	18.933	

PT.	UNF.		TOP REINFORCE.		BOT. REINFORCE.		CAP DESIGN DATA				D IN.	FC PSI	PS %	FS/FF RATIO	FS/FZ RATIO	
	M+	M-	AS	NO. SIZE	AS	NO. SIZE	M.SP.	AV/IN	LEFT STIRRUPS	RIGHT STIRRUPS						
P 1	-25.482	-25.482	3.12	2 # 11	3.12	2 # 11	0.00	0.000	#5@ 0.00	24.00	0.060	#5@10.33	59.14	0.08	0.000	0.099
P 2	-2556.548	-3243.604	13.63	9 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	24.00	0.169D#5@	7.35	83.71	0.25	0.563	1.210
P 3	-5266.726	-6709.546	24.80	16 # 11	3.12	2 # 11	24.00	0.135	#5@ 4.59	24.00	0.135	#5@ 4.59	96.00	0.41	0.593	1.040
C 1	-8089.646	-10288.230	38.97	25 # 11	3.12	2 # 11	24.00	0.145	#5@ 4.29	24.00	0.145	#5@ 4.29	96.00	0.63	0.593	0.977
P 5	-5266.726	-6709.545	24.80	16 # 11	3.12	2 # 11	24.00	0.135	#5@ 4.59	24.00	0.135	#5@ 4.59	96.00	0.41	0.593	1.040
P 6	-2556.548	-3243.604	13.63	9 # 11	3.12	2 # 11	24.00	0.169D#5@	7.35	24.00	0.060	#5@10.33	83.71	0.25	0.563	1.210
P 7	-25.482	-25.482	3.12	2 # 11	3.12	2 # 11	24.00	0.060	#5@10.33	0.00	0.000	#5@ 0.00	59.14	0.08	0.000	0.099

NOTE: *** FS/FZ RATIO EXCEEDS 1.0! ***

PIER-36-5-140-50.OUT

CRITICAL COLUMN LOADS

CN	T	B	GR	LLC	WC	R	E	C	S	PF	MTF	MLF	PM	MTM	MLM	PU	MTU	MLU	PU/PM	B	D
1	T	1	LL	2	0.0			C		2891.9	-4992.4	0.0	2891.9	5809.7	2263.6	7985.5	16043.8	6250.9	2.762	72.00	96.00
1	B	3	LL	3	4.1			C		3189.4	4268.5	-4322.4	3189.4	4937.5	5576.0	6414.7	9901.8	11182.4	2.006	72.00	96.00

COLUMN DESIGN DATA

CN	T	B	FACE 1	B	FACE 2	D	FACE 3	D	FACE 4	AS	PS	BD12	BD	SUMPU	SUMPC	DEL.T	DEL.L	CM	R	PHIC
1	T	15	# 11	15	# 11	8	# 11	8	# 11	71.76	1.038	1.00	0.000	3098.	22021.	1.164	1.305	1.000	2	0.70
1	B	15	# 11	15	# 11	8	# 11	8	# 11	71.76	1.038	1.00	0.000	2984.	22021.	1.157	1.290	1.000	2	0.70

FOOTING 1 DESIGN LOADS

F	G	LLID	WC	ES	C	S	P	MT	VT	ML	VL	P4	P3	P2	P1	MTF	VBF	VPF	LOAD
1	3	LL 3	3.1		C		2394.509	3441.672	40.764	-2990.040	-47.960	204.197	126.900	216.197	293.494	237.948	43.393	46.026	MAX.P1
1	3	LL 2	1.1		C		3007.667	5917.869	57.504	-1992.623	-31.863	215.599	164.100	315.886	367.385	320.138	58.290	57.869	MAX.MT
1	3	LL 2	1.1		C		3007.667	5917.869	57.504	-1992.623	-31.863	215.599	164.100	315.886	367.385	320.138	58.290	57.869	MAX.VT
1	3	LL 3	3.1		C		3112.861	4474.174	52.993	-3887.052	-62.348	265.456	164.970	281.056	381.543	309.333	56.411	59.834	MAX.VP
1	3	LL 3	5.1		C		3112.861	3168.195	31.480	-4648.873	-74.897	292.690	172.465	253.822	374.048	370.773	55.276	59.834	MAX.ML
1	3	LL 3	5.1		C		3112.861	3168.195	31.480	-4648.873	-74.897	292.690	172.465	253.822	374.048	370.773	55.276	59.834	MAX.VL
1	3	LL 2	3.1		C		2313.590	4175.482	38.028	-2537.386	-41.058	183.869	118.225	224.965	290.609	241.024	43.928	44.514	MAX.P3

FOOTING 1 ANALYSIS/DESIGN RESULTS

FOOTING SIZE				* BAR REINFORCEMENT STEEL *					SECTION CAPACITIES *			
B	D	T	P1/PA	AS	NO.SIZE	SPAC.	PLACEMENT	MT.	VB	VP	DS	FC
22.000	22.000	5.750	0.999	1.40	25 #10	@10.500	TOP TRAN	329.536	62.703	125.407	51.955	0.000
				1.59	23 #11	@11.375	BOT.LONG	381.079	64.321	128.641	53.295	0.000

NUMBER OF PILES = 14 BP = 3.250 DP = 3.250